class of information to which so much space is at present devoted in the public press of America.

More than 10,000 crop correspondents are to-day co-operating with the National Weather Service through the State organisations; 3000 voluntary observers are furnishing monthly reports of daily observations of temperature and rainfall; and over 11,000 persons assist in the work of distributing the weather forecasts of the National Weather Service. This latter work has been more rapidly pushed during the past year than any other feature of State Weather Service work, and it is expected that during the ensuing year the already large number of communities receiving the Government weather forecasts will be further increased from 5000 to 6000. With a continuation of the present liberal policy of the Secretary of Agriculture and the Chief of the Weather Bureau towards these services, there will be in a comparatively short time no important agricultural community in the United States, with the proper mail facilities, that will not receive the benefits of the forecasts.

The monthly reports of many of the States are model publications of their kind. It is to be hoped that in those States where as yet the more approved methods of publishing meteorological data are not practised, means may be improved and raised to the standard attained where better facilities have been available. Uniformity in size, as far as practicable, and strictness as to tabular data, is very desirable. A daily record of temperature and rainfall for purposes of detailed investigation is most essential, and these should, if possible, form a part of each report.

The following papers were read before the American Forestry Association:—The forests of Alaska, by William H. Dall; the forests of the Shenandoah Valley, their origin and present condition, forestal areas in West Virginia, by Major Jed Hotchkiss; forests in New Jersey, by Prof. John C. Smock; the petrified forests of Arizona, by Horace C. Hovey; the Adirondack Forests, by Verplanck Colvin; the condition of our public timber-lands and forest reservations, by B. E. Fernow; what the people should learn about forestry, by Prof. Selden J. Coffin; tree-planting, by George H. Minier; forest fires in New Jersey, and some notes in methods of protection, by John Gifford; the prevention of forest fires, by General C. C. Andrews; prairie forestry, by Prof. L. H. Pammel; observations on the destructive effects of drying winds and the protection afforded by woodlands and wind breaks, by Prof. F. H. King; Does the rain-gauge settle the problem? by J. O. Barrett; the conservation of soil and water supply of hill countries in cultivated areas, by Thomas J. McKie; black walnut for economic tree-planting, by B. G. Northrup; Western pine timber-lands, by H. C. Putnam; economics in railway ties, by E. E. Russell Tratman; forest fungi and an anthracnose of the poplars, by Prof. Byron D. Halsted; the relation of insects and birds to certain forest conditions, by A. D. Hopkins.

B. E. Fernow called attention to the necessity of following up the policy begun through the efforts of the Association of reserving forest tracts of public timber-land with measures for a rational use of the same. Considerable discussion followed, resulting in the unanimous adoption of the subjoined resolution:

"Resolved, that the American Forestry Association desires to express again emphatically its approval of the efforts of the Public Lands Committee of the House of Representatives, and its chairman, the Hon. Thomas C. McRae, for the enactment of a law providing for the care and protection, not only, but for the rational use also, of the timber and other resources in the forest reservation, and on all public timber-lands. The policy of reserving can hardly be considered an advantage to the forestry interests unless followed up by an intelligent and efficient administration of the reservations, since deprived of the incidental protection. This Association emphatically denies that it advocates in the policy of forest reservations the unintelligent exclusion of large territories from actual use of the resources contained therein; but on the contrary, it reiterates that it conceives that by the reservations made for the purpose of their use—rational use—under restrictions and control which come from private interests in expectation of possible occupancy and uncared for by the rightful owner, the Government, the door is opened to greater destruction and depredation than before. We therefore desire to impress upon our representatives in Congress the urgency of making provisions for the better care of the public timber and other resources, as urged heretofore by this Association."

RECENT EXPLORATION IN BRITISH NEW GUINEA.

AT the ordinary monthly meeting of the Royal Geographical Society of Queensland, on August 20, the President (Mr. J. P. Thomson) read a paper on recent exploration in British New Guinea. The paper was a continuation of one read by the Governor at the Hobart meeting of the Australasian Association for the Advancement of Science in January, 1892. Since then several tracts of new country have been visited, and geographical knowledge of it has been increased by the detailed examination made by Sir William MacGregor of the extensive river systems of the Papuan Gulf, and his more recent exploration of the hitherto unknown parts of the north-east coast. The following extracts from Mr. Thomson's paper are reprinted from the *Brisbane Courier*.

For nearly half-a-century it had been known to geographers that several rivers existed in the neighbourhood of the Papuan Gulf. The Aird, especially, was noticed by the officers of H.M.S. *Fly* some forty-seven years ago, and more recently several channels were opened up by Mr. Theodore Bevan, whose investigations in British New Guinea were chiefly confined to this part of the country. Although these were nothing more than superficial surveys of a mere coastal fringe of the Gulf district they were the means of drawing attention to an exceedingly interesting and important part of the Possession. Here we are made acquainted with a tract of country north of the Fly estuary, cut up by almost bewildering labyrinths of tidal channels that constitute the mouths of several important rivers, which traverse enormous areas of rich agricultural as well as low, swampy, land. To intending settlers in British New Guinea this easily accessible region offers many inducements not readily met with in other parts of the Possession. Ample facilities for inland communication exist in several of the deep-water channels along the coast, while the recently explored Purari River flows through a region possessed of many attractive features of hilly and mountainous country. Along most of the watercourses native villages are thickly scattered, and these are inhabited by numerous tribes of powerful and warlike natives, who on several occasions have opposed the friendly advances of Europeans with formidable hostility. The houses, too, are truly remarkable for their large dimensions and massive architectural structure; dwellings of from 300 ft. to 400 ft. in length and over 100 ft. high being by no means uncommon. Next to the Fly the Purari is the largest river in the Possession. It enters the sea by several large channels. In the inland reaches above tidal influence it traverses some rough, hilly country, flowing almost parallel to and skirting the base of a mountain range 1500 ft. to 2500 ft. above sea level. This river was explored by Sir W. McGregor in January and December 1893. Its average width is about 250 yards. To the north lie a range of mountains 3000 ft. to 4000 ft. high, and southerly the country is greatly broken up by low rugged hills. To the westward the main range is visible at a distance of from fifteen to twenty miles, with its bold serrated perpendicular peaks. There is very little flat land here between the hills and the mountain spurs, although sago palms are more numerous than in some parts of the country lower down the river. The geological formation consists of sandstone associated with nodules of gray limestone. At the Aure junction, some eighty miles from the sea, the Purari receives its first considerable tributary. The width of this branch is from 80 to 100 yards, with a depth of one to two fathoms. Above its junction with the tributary the Purari maintains a general course along the main mountain range, the southern spurs of which it skirts very closely. Here the general character of the country, on the south side of the river, is a continuous succession of low sandstone hills, little more than 800 ft. high. These are rugged and precipitous, covered by dense forest. There are, however, no large trees. There was no appearance of any permanent native occupation in this district, and owing to its rugged nature the country did not seem adapted for European settlement. Several specks of gold were found in the bed of the river, and an important discovery of coal was also made near the island of Abukiru, in the main channel of the Purari River. As it is thought that the presence of coal in this district may greatly influence the future of the country, it has been proposed to arrange for a detailed examination of the locality. The people are bronze coloured, a few being lighter than the Port Moresby natives, and all lighter than those of the Purari delta. West of the Purari delta, between the mouths of the Fly and Aird Rivers, lie three important streams, the Omati, Turama, and Bamu. These traverse enormous areas of low-lying country. Concerning each of these rivers, Mr. Thomson gave some interesting details, the result of Sir William MacGregor's explorations. Continuing, he remarked: "The exploration of the lower Bamu basin, besides throwing a flood of light upon a hitherto unknown part of the country, reveals to us a condition of things not easily understood, and rarely met with in any other district of the Possession. Here no cultivated areas were seen, although the soil is exceedingly rich and abundantly watered. The people appeared to live entirely on sago. Bananas were growing wild amongst the rank forest vegetation, but there were no signs of sugar-cane or sweet potatoes. A fair idea of the richness of the land in this district may be obtained when it is stated that there is nothing to be compared with it in the Fly basin within 400 miles of the sea. It is high and dry and in every respect eminently suitable for extensive and systematic cultivation, there being a much larger area of good available agricultural land than Sir W. MacGregor had 'seen elsewhere in the Possession.' This district could no doubt be thrown open to European settlement without in any way infringing existing native rights." Mr. Thomson then dealt with some of the newly-discovered features on the north-east coast of the possession examined by Sir William MacGregor during the months of February and March last. "Recent detailed examination of some hitherto unexplored parts of the coast-line," said the writer, "has discovered the existence of several navigable streams of considerable importance, while a traverse of the coastal section between Ipote and Dako shows that there are numerous sheltered channels among many coral islands along the shore of the bay. These will be available for trading crafts in all kinds of weather. Passing on from this part of the coast-line, an examination was made of the mouth of a stream slightly north of the Clyde river, within the German territory. From observations of ten pairs of meridian stars the latitude of this stream was found to be 7° 58′ 30″ S., taken at the place where it enters the sea. It is a comparatively small watercourse, forty or fifty yards wide on the lower reaches. The natives here are of a dark bronze colour and quite naked. The hair is worn in ringlets, and removed from the face. Their ornaments consist of Job's tears, earrings of turtle shell, and head ruffs of cassowary feathers. They were armed with spears of palmwood, Gothic shaped shields nearly 3 feet long, and stone clubs. At first they were friendly, but afterwards appeared hostile. The next river to claim attention is called the Mambare. This is simply one of the mouths of a river known as the Clyde, of the Admiralty charts. It lies about two miles within the British territory, and in the lower part traverses some good alluvial land, abounding with remarkably fine fields of sago palms. The river was navigable by the steam launch for the first forty miles, where further progress was impeded by rapids, and some few miles farther the channel is simply a succession of deep pools. Below the rapids some extensive areas of very fine alluvial land were met with, and the forest trees so high that the birds on the upper branches bade defiance to the marksman's firearms. Above the rapids the country was broken, and little agricultural land was to be seen. The district possesses a very fine climate. Sandflies and mosquitoes were entirely absent, and the early morning atmosphere was decidedly cool and bracing. The people have well-cleared and cultivated gardens, in which they plant taro, sugar-cane, edible hibiscus, yams, and bananas; but there were apparently no tobacco, papaya, nor pumpkins. Several villages were located on the banks of the river, some of which are situated in the midst of beautiful groves of cocoanut and betel palms. The only ornamental shrubs met with consisted of a remarkably fine variety of light yellow crotons of great beauty. Ordinary watercresses were met with at one of the villages, but they were seen at no other place on the north-east coast. The men were profusely ornamented with shells, pigs' teeth, Job's tears, cassowary feathers, red seeds, and bones. Some of the women wore a necklace or two, others a narrow matwork belt, but they were clothed with nothing else. In this part of the country they use the password 'Orokaiva,' meaning 'man of peace.' They use an adze of basalt. Their pottery is not well prepared. It is without ornament, thick, and slightly conical in shape. The people seemed to be industrious agriculturists, growing food for the entire population. They possess a great number of canoes. Sir William MacGregor is of opinion that some good agricultural land could be obtained for European settlement without interfering with native occupation, and he further believes that the natives would welcome European settlers who would be prepared to treat them fairly." The next place visited was a small sluggish river, fifty to sixty yards wide, and two fathoms deep, called the Ope or Opera. The position of its mouth was found to be lat. 8° 18′ 16″ S., and long. 148° 11′ 25″ E. It is convenient for watering ships and of value to traders. Several villages were seen in the neighbourhood, and there was evidence of a large population of friendly natives. The men were nude, but the women were covered by a petticoat of native cloth. They were armed with spears and stone clubs, ornamented with wreaths of convolvulus and red hibiscus. They danced, sang, and shouted, but appeared to be very friendly. To the south of this district the Kumusi River flows into Holnicot or Gona Bay, in lat. 8° 28′ S., and long. 148° 16′ E. The mouth is obstructed by a bar, some four feet below the surface. Most of the land on the lower part of this river is low and unfit for European cultivation, although considerable areas of alluvial deposits are occupied by many native gardens, and there are fine fields of sago palms. The highest point reached was about forty-six miles from the sea, by traverse, or lat. 8° 35′ S. and long. 148° 0′ 20″ E., where further progress was barred by rapids. Here the country "was without exception the most attractive" Sir W. MacGregor had "seen in New Guinea." Extensive tracts of splendid alluvial land stretched far and wide along the river valley, covered by forest trees, and to all appearance above the reach of flood. These flats occupy what was formerly the river bed, as indicated by the sandy substratum. Some six miles from the river lay one of the central main mountain ranges, the intervening space being occupied by small mountain streams, numerous rolling wooded hills and flats. At night the air was pure and delightfully cool. Great reluctance was felt at having to leave such a district, where the scenery is of a very fine description. There is apparently a large population here, but the people would no doubt be friendly. When descending the river the steam launch *Ruby* collided with a treacherously concealed snag and foundered. This unfortunate accident compelled the party to travel down an open unprotected coast in the whale and river boats. The Kumusi natives were unusually interesting. They are from a light to a dark bronze colour, not remarkably powerful people, but of fair Papuan physique. Their foreheads are square and rather high, with hazel eyes of fair size, large mouth, small chin, and flat cheeks and chests. The nose resembles that of Port Moresby, only slightly shorter, and the nostrils rather coarser. Both sexes wear cloth of mulberry bark. They use stone clubs, the disc and the pine-apple pattern, the palmwood spear with square-shaped sharp end and barbs on one side only, and small Gothic shields, with a few examples of the great shield of Orangerie Bay. The stone clubs and adzes are made of basalt. They have no tobacco growing in their gardens, and were ignorant of its use. Their canoes are similar to those on the Ikore and Mambare Rivers. It was found that a river of considerable size enters the sea at Cape Sudest, but unluckily a bar closes its entrance to navigation. The natives call it Tambokoro. The position of Cape Sudest was determined astronomically, and found to be in lat. 8° 44′ S. and long. 148° 25′ 30″ E. In Dyke Acland Bay three streams were discovered—Kevoto and Umundi Creeks and the Musa River. The mouth of the first of these lies in lat. 9° 4′ 55″ S. and long. 148° 33′ 20″ E. Both creeks are of little importance. The lower part of the Musa River traverses low, swampy country, covered by water when the river is flooded. When ascending this stream the Administrator passed within a few miles of the western peaks of Mount Victory. "It has three principal summits, the western one of which is at present quiescent." Ashy-looking deposits were observed among the rocks on the others, and several large fumeroles, out of which little spiral clouds of smoke were issuing. The highest point reached on the river was about thirty-five miles from the sea in lat. 9° 19′ 20″ S. and long. 148° 53′ 43″ E. Here the stream was about 100 yards broad, three fathoms deep, and the current two to three knots per hour. This place was evidently on the margin of a settled country. The banks of the river were beginning to rise, and the capacity of the channel was about sufficient to carry the water. The forest trees were very large. What the upper portion of the

Musa basin may be is at present unknown, but the lower part appeared to be of little value. Several villages occupy the flooded country on the banks of the river; the houses are built on stilts a few feet above the water. The natives were friendly, but naturally shy and suspicious. They excel in making native cloth, many specimens of which were obtained. Their dead are interred in the villages, the graves being covered with a neatly thatched cage. They use palmwood spears, stone clubs, and adzes of jade. Both sexes wear a native cloth. The men wear the hair long, hanging down the back. They cook their food in clay pots, and eat lime and betel nut. The men were fairly strong and of good physique, but many were suffering from ringworm and hydrocele. They were anxious to trade, and offered adzes, clay pots, and sago for plane-irons. Some very remarkable pottery was obtained on the north-east coast. The examples are bowl-shaped with outside raised designs, not previously seen in any other part of British New Guinea. Besides these explorations the discovery of Pennegwa Harbour in the extreme north-east of Rossell Island, and a safe anchorage at Mabudaun, which very greatly increases the value of the western portion of the Papuan territory, were described. Mr. Thomson, by means of a map, indicated the territory dealt with in his paper, and at its conclusion a few pictures appropriate to the occasion were thrown on to the screen by Dr. Thomson.

In the course of some remarks, Sir William MacGregor suggested that Mr. Thomson might follow up his paper with another. The one he had just read did not embrace all the latest work that had been done. His (Sir William's) dispatches had not all been printed; in fact, he questioned whether some of them had yet reached his Excellency the Governor. There was a great deal of information which might be included in such a paper. For instance, Mr. De Vis had been examining a number of new and interesting native birds; Baron Von Müller had got a lot of new plants; but perhaps the most interesting, because the most practical, was the work being done by Mr. Jack and Mr. Rands. The geological specimens he had brought from the Purari River indicated a very large district in which there were very rich coal formations. The fossils that were under examination would show very clearly, he thought, the age of the deposit.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

Oxford.—In the lists of lectures announced for the present term, the most noteworthy feature is the removal of the subject of Anthropology from the list of the Faculty of Natural Science, and its insertion under that of Literæ Humaniores. The titles of the Anthropological lectures are "The Intellectual Development of Mankind," by Dr. Tylor; "The Elements of Physical Anthropology," by Prof. A. Thomson; and "Primitive Musical Instruments," by Mr. H. Balfour. There does not appear to be any adequate reason for considering that these subjects should belong to letters rather than to Natural Science, but perhaps it is a sign that a day is approaching when all the subjects of Natural Science will be recognised as forming as much a part of *literæ humaniores*, that is, of indispensable culture, as Philosophy and Ancient History. In the departments of Natural Science there is no change of importance to chronicle. Professors, Lecturers, and Demonstrators are the same as in the past academical year, and the subject-matter of the lectures refers in each case to the examinations in the Honours School of Natural Science. Mr. R. T. Günther is in residence at Magdalen College as Science Tutor, and Mr. W. Garstang is in residence at Lincoln College, and will deliver a course of lectures as Lecturer in Natural Science to the College.

The examination for the Burdett-Coutts Scholarship will be held in the week beginning October 21.

The Vice-Chancellor has appointed Mr. William Holman Hunt the Romanes Lecturer for the year 1895.

A copy of the report of the Minister of Public Instruction in New South Wales, for the year 1893, has reached us. The work of the Technical Education Board for that year was carried on under very different conditions from those of previous years. The scheme for retrenchment of expenditure in the public service led to the reduction of the vote for Technical Education from £49,800 in 1892, to £25,367 in 1893. The field of operations had therefore to be confined within comparatively narrow limits. Only 187 classes were carried on throughout the whole year, and the total number of students was 7096. In addition to the ordinary class work, popular lectures on various subjects were given at different centres throughout the colony. The success of these lectures may be judged from the fact that the Rev. J. Milne Curran lectured in Geology and Mineralogy to audiences aggregating 13,360 persons, or an average of over 300 persons at each lecture.

The *Record of Technical and Secondary Education* completes its third volume with the current number. The journal was only started tentatively, but the experience gained during the last three years has shown that it is wanted, so it will be continued. The present number is full of information of use to promoters of technical education. It includes the reports of the technical instruction committees of Somerset, Hampshire, Isle of Wight, Staffordshire, and Worcestershire. Mr. W. E. Urwick gives a description of primary and secondary education in France, first tracing the progress of an imaginary boy from the primary school upward, and then detailing the means of transition from one school to another, the help offered by the State, and the method of procuring it. So many committees have had to confess that their schemes of agricultural education have, to say the least, been unsuccessful, that an article on the promotion of such instruction in Great Britain should be widely read. It is pointed out that elementary agricultural education must be founded definitely on science, though this may be elementary. The subjects likely to be of most use are chemistry, botany, and zoology. Mathematical subjects should, if only as a matter of education, engage earnest attention, and it is suggested that elementary physics, leading up to the construction of the steam engine, might replace botany or zoology in the curriculum. There must always be stations for field demonstrations and experiments, and this class of work is of a threefold nature. "First, there is the demonstration of the known action of certain elements of plant food when used in manures; it is this which is truly educational. Next comes what may fairly be called experiment, viz. the testing in each locality of the action of different manures on different crops or typical soils. Lastly, there is pure research into the unknown, a matter which can only be successfully carried out at special places, thoroughly well-equipped for this particular purpose. While, however, it is to be hoped that Rothamsted will always form the premier research station for the kingdom, there would seem to be no reason why stations such as that which the Royal Agricultural Society have at Woburn might not, within limits, be multiplied." In addition to the articles already referred to, the *Record* contains an illustrated description of the fine Technical College at Bradford.

The "Guide to Technical and Commercial Education," first issued by the Dundee and District Association for the Promotion of Technical and Commercial Education some five years ago, and the third edition of which has recently been published, has done good service. The object of the guide was to indicate the lines along which apprentices might with advantage be urged to a systematic continuance of their education in subjects bearing on their particular occupations. In point of fact, the aim of the Committee was to do for the apprentice architect, engineer, mechanic, or other craftsman, in the Technical School, what long ago in the Universities has been done for the professions by the institution of definite lines of study. Several Technical Instruction Committees have drawn up similar courses of study to be followed by young artisans in order to become efficient workmen; and when such schemes are properly drafted, they serve a very useful purpose.

SCIENTIFIC SERIALS.

Quarterly Journal of Microscopical Science, vol. xxxvi. part 4, August.—In the first of a series of "Studies on the Nervous System of Crustacea," Mr. Edgar J. Allen gives the results of a careful investigation of the structure of the brain and ganglionic chain in lobster embryos. By the employment of Ehrlich's methylene blue method he has been able to demonstrate the course of the constituent nerve-fibres, both co-ordinating, motor, and sensory, with remarkable success. The author's observations agree with those of Retzius, Kölliker, and other recent investigators, as to the absence of any form of anastomosis between the fibres of different elements. Nervous discharges must, however, pass from one element to another by